First Generation

First Generation

Second Generation

where  $X = \text{nothing or S or S(CH}_2)_2\text{O or S(CH}_2)_3\text{O or S(CH}_2)_4\text{O}$ ;  $Y = O \text{ or SS or (CH}_2)_2\text{O or S(CH}_2)_3\text{O or S(CH}_2)_4\text{O}$ ; A = SSor O; [P] = H or Ac or Bn

$$OF = \begin{bmatrix} PO & O[P] & O[P] & PO & O[P] & PO & O[P] &$$

#### Type C - ArGal type

where  $X = \text{nothing or S or S(CH<sub>2</sub>)}_2O \text{ or S(CH<sub>2</sub>)}_3O \text{ or S(CH<sub>2</sub>)}_4O$ ;  $Y = O \text{ or SS or (CH<sub>2</sub>)}_2O \text{ or S(CH<sub>2</sub>)}_4O$ ; A = SSor O;  $P = H \text{ or Ac or Bn, } Z = H \text{ or CH}_3O \text{ or S(CH<sub>2</sub>)}_4O$ ;

$$O[P] \qquad O[P] \qquad$$

Figure 3

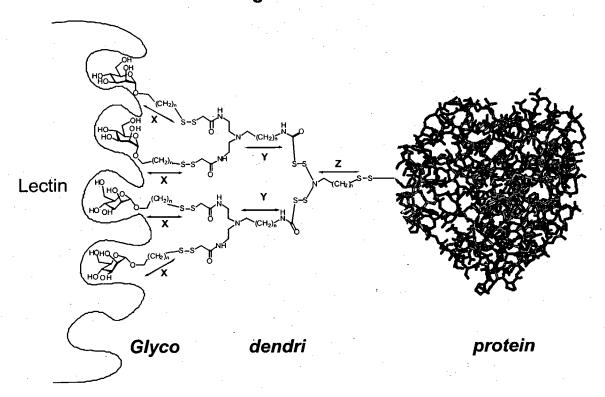


Figure 4

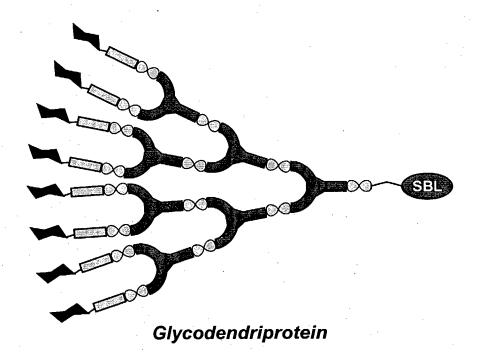
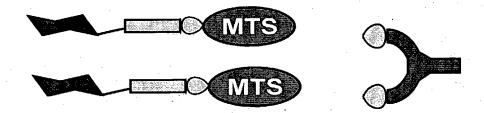
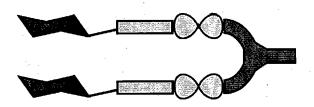
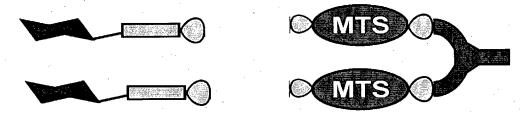


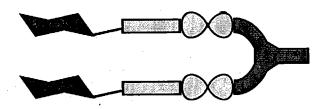
Figure 5





### Normal Addition





Inverse Addition

### Scheme 1

1

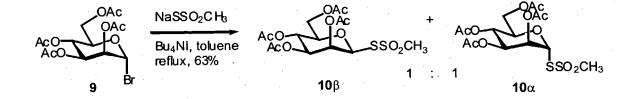
2

3

#### Scheme 2

AcO OAc 
$$AcO$$
 OAc  $AcO$  O

### Scheme 4



### Scheme 5

OAc

NaSSO2CH3

ACO

OAc

NaSSO2CH3

ACO

OAc

SSO2CH3

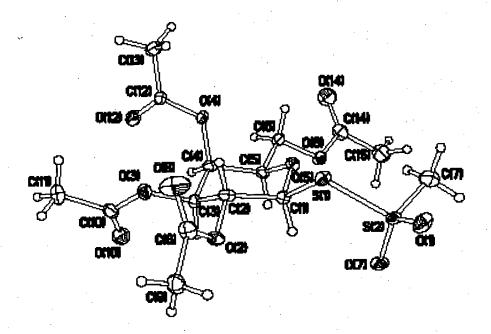
ACO

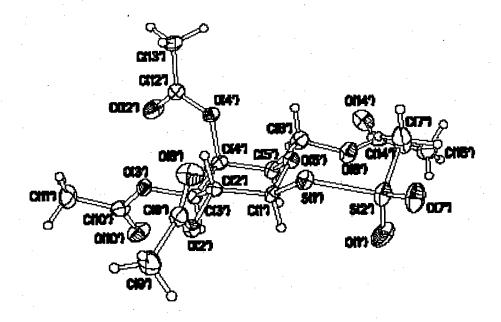
OAc

OAc

123

Figure 8





5β

Figure 9

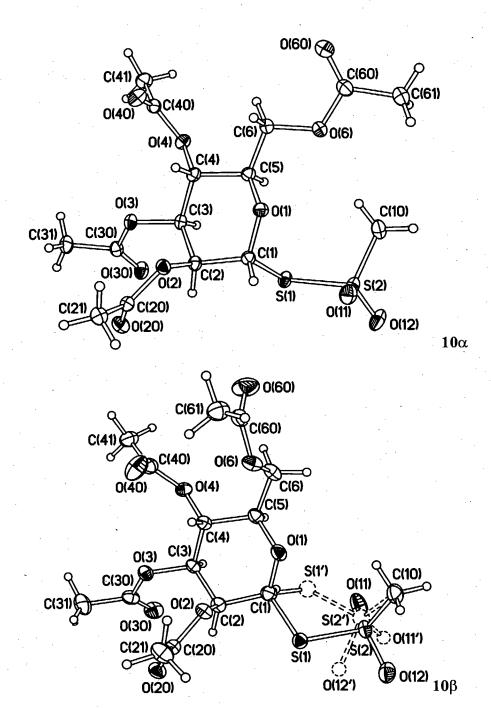


Figure 10

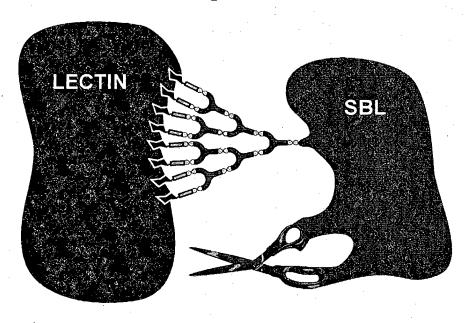
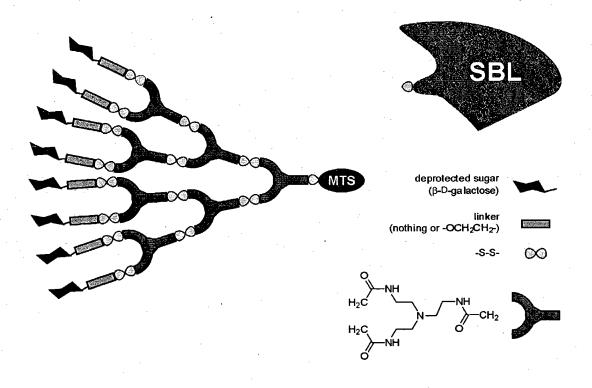


Figure 11

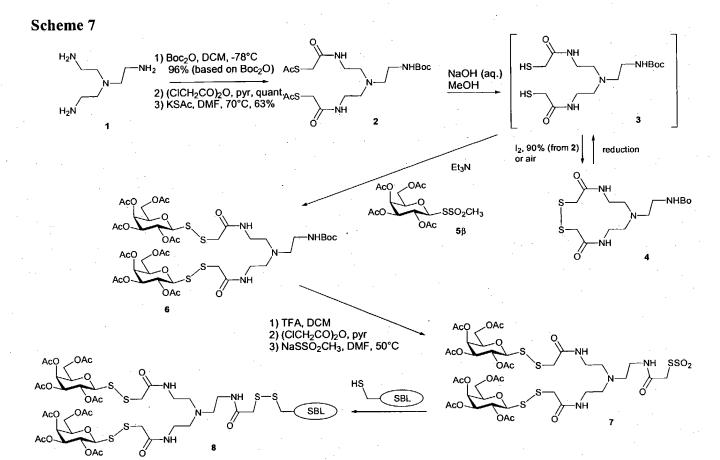


#### Scheme 6

6' a,b

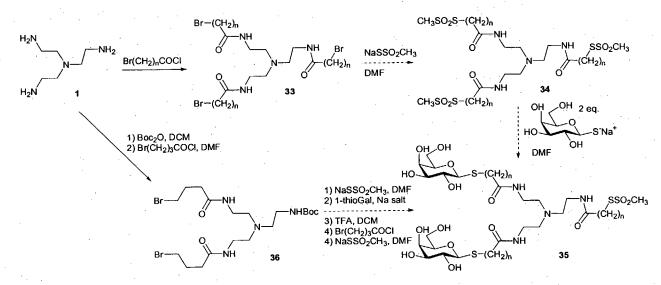
where 
$$OH$$
 $OAC$ 
 $OAC$ 

### Glycodendrimer proteins from 7'a, 7'b



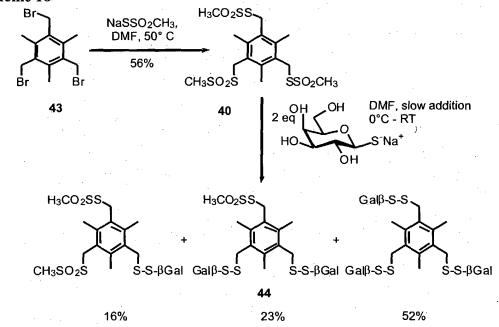
### Scheme 11

### Scheme 12



### Scheme 15

#### Scheme 17



#### Scheme 19 .SSO<sub>2</sub>CH<sub>3</sub> SAc 2 eq. $NaSSO_2CH_3$ , 1 eq. KSAc, DMFSSO<sub>2</sub>CH<sub>3</sub> CH<sub>3</sub>SO<sub>2</sub>S AcŚ \$Ac 46 45 43 44% 18% SSO<sub>2</sub>CH<sub>3</sub> SAc SSO<sub>2</sub>CH<sub>3</sub> SAc CH<sub>3</sub>SO<sub>2</sub>S AcŚ 47 48 15% Scheme 20 OH. CO2CH3 МеОН, ÇO<sub>2</sub>H LIAIH4 THF cat. H<sub>2</sub>SO<sub>4</sub> reflux 83% 87% CO<sub>2</sub>CH<sub>3</sub> H<sub>3</sub>CO<sub>2</sub>C HO<sub>2</sub>C CO<sub>2</sub>H **50** 49 Br 51 52 -SSO<sub>2</sub>CH<sub>3</sub>

-SSO<sub>2</sub>CH<sub>3</sub>

53

### Scheme 21

S156C-SS-ArGal-(SS-Gal)<sub>2</sub>

## Figure 23

